Worksheet 2 Number systems, ASCII and Unicode Answers

Task 1

1. Convert the following decimal values into 8-bit binary bytes:

   a) 10_{10} = 00001010

   b) 104_{10} = 01101000

   c) 255_{10} = 11111111

2. A single byte can be used to represent the decimal values 0_{10} to 255_{10}. For values over $255_{10,}$ bytes can be joined together. In a computer that has a 16-bit bus width, an integer would be stored in two consecutive bytes.

   For example, to represent 654_{10} the two bytes used would be:

Byte 2								Byte 1							
2^{15}	2^{14}	2^{13}	2^{12}	2^{11}	2^{10}	2^{9}	2^{8}	2^{7}	2^{6}	2^{5}	2^{4}	2^{3}	2^{2}	2^{1}	2^{0}
32,768	16,384	8,192	4,096	2,048	1,024	512	256	128	64	32	16	8	4	2	1
0	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**1**	**0**	**0**	**0**	**1**	**1**	**1**	**0**

   Convert the following denary values into 2 bytes:

   a) 127_{10} byte 2 = 00000000 and byte 1 = 01111111

   b) 3188_{10} byte 2 = 00001100 and byte 1 = 01110100

   c) 65535_{10} byte 2 = 11111111 and byte 1 = 11111111

3. Put the following byte prefixes in order of size from smallest to largest:

   mega gibi kibi tebi kilo giga tera mebi

Prefix	Symbol	Number of bytes
kilo	k	1,000
kibi	Ki	1,024
mega	M	1,000,000
mebi	Mi	1,048,576
giga	G	1,000,000,000
gibi	Gi	1,073,741,824
tera	T	1,000,000,000,000

tebi	Ti	1,099,511,627,776

Task 2 Representing characters **Answers**

1. Using the 'ASCII codes' helpsheet, answer the following questions:

   a) What is your forename in ASCII?

   Answers will vary.

   b) Convert the following ASCII sentence to text:

01000100	**01001110**	**01000001**	**00100000**	**01110111**	**01100001**
D	N	A		w	a
01110011	**00100000**	**01100100**	**01101001**	**01110011**	**01100011**
s		d	i	s	c
01101111	**01110110**	**01100101**	**01110010**	**01100101**	**01100100**
o	v	e	r	e	d
00100000	**01101001**	**01101110**	**00100000**	**00110001**	**00111001**
	i	n		1	9
00111000	**00110100**	**00101110**			
8	4	.			

   c) Explain why when adding the characters '2' + '3' you don't get 5:

   As the numbers are codes for the characters '2' and '3' their binary values are 50 and 51. Adding these values together does not give the answer 5. If this was written into a computer program the 2 and 3 characters would be treated as strings and the output would be 23.

2. Create a spreadsheet that can convert a word of up to 8 characters into ASCII character codes. (Use the menu option Formulas, Show formulas or press Ctrl + ` to display the formulas in a spreadsheet.. The ` character is the top leftmost key on the keyboard.)

	A
1	a
2	=CODE(A1)
3	=DEC2BIN(A2,8)

Extend the spreadsheet to convert ASCII binary codes back to regular characters.

5	1100001
6	=BIN2DEC(A5)
7	=CHAR(A6)